

adhesive such that no expulsion of glue from the host device is needed. Alternatively, glue removed from the staples could be directed into a waste container which is periodically emptied by an operator. Moreover, a combination of physical fragmentation, heat, and material removal could be employed, and all such variations are intended to be included within the scope of the present invention.

In a preferred embodiment, adhesive used for bonding the staple wire plates together is strong enough to hold the plates together while being manually handled, during placement into a stapling mechanism, and for a period leading up to consumption of staple wires within a refill or package of staple wires. Furthermore, the same adhesive is preferably weak enough to allow the plates to readily separate once appropriate separation force is applied to one plate of a refill, the remainder of the refill, or both a plate and a remainder of the refill at once. Such separating force is preferably applied in order to advance the wires within a selected plate toward a stamping mechanism for adhering individual staples to paper or other appropriate media.

While the above discussion has primarily been directed to the use of the inventive consumable part bonding mechanism in conjunction with automatic copy machines, it will be appreciated that other office equipment such as fax machines and scanners may also be used in conjunction with the present invention. Moreover, manually operated devices as well as automatic devices may employ the inventive part bonding mechanism, and all such variations are included within the scope of the present invention. The inventive mechanism is not limited to bonding staples together but may be applied to paper clips, pins, and any other consumable parts formed into stacks or packages which store parts employing a repetitive pattern of closely spaced parts configured for use in a consuming device such as a stapler.

Therefore, it is an advantage of a preferred embodiment of the present invention that stacked staple wire plates are sufficiently strongly bonded together so as to prevent separation of such plates prior to activation of an appropriate advancement mechanism within a staple machine.

It is a further advantage of a preferred embodiment of the present invention that human operator intervention is generally not needed for the purpose of material removal after a staple wire refill has been inserted into a staple machine.

It is a still further advantage of a preferred embodiment of the present invention that any residue from material used to bond together components of a staple wire refill is either consumed or expelled from a copy machine or other host device through normal operation of the stapling mechanism of such host device.

FIGURE 1 is an isometric view 101 of the application of adhesive 103 to the upper surface of the uppermost sheet 102 of refill 303 preferably consisting of a stack of staple wire sheets according to a preferred embodiment of the present invention.

In a preferred embodiment, staple wire sheets, such as staple wire sheet 102, consist of a plurality of wires joined to each other along a direction parallel to the axis of each wire. Preferably, the connection between wires forming staple wire sheet 102 is established during manufacture of sheet 102 and consists of individual wires bonded to adjacent wires by means of a preferably brittle glue. Preferably, the connection formed by the preferably brittle glue is easily ruptured when removal of individual staple wires is desired, without inflicting any damage upon staples remaining within sheet 102.

For example, where staple wires are removed from sheet 102 by stamping or forming a wire located at a leading edge of sheet 102 into a "U"-shaped staple, and simultaneously, or soon thereafter, affixing such formed staple to paper or other media, such forming or stamping is preferably completed without damaging or distorting the shape of a remainder of sheet 102. Additionally or alternatively to employing glue to provide a detachable connection between individual staple wires connected to form staple wire sheet 102, perforations may be employed along a connecting edge between adjacent wires within wire sheet 102, and all such variations are intended to be included within the scope of the present invention.

In a preferred embodiment, a plurality of staple wire plates, such as staple wire plate 102, are stacked together to form a staple package or staple refill (such as staple refill 303) for insertion into a staple machine or other host device in order to adequately provision such host device for a substantial number of stapling operations. One embodiment of such a refill is that of a substantially cube-shaped structure such as refill 303 shown in FIGURE 3. The effective deployment of such a refill 303 preferably involves providing a package of staples which can be handled by a human operator, placed in a stapling machine or other host device, and processed in such host device while maintaining the mechanical integrity of the cube structure, or other geometric form of refill 303, until a stapling operation requires the removal of one staple wire from a sheet 102 and/or the separation of one sheet 102 from the refill 303 as a whole.

In a preferred embodiment, the various staple wire sheets, such as sheet 102, are glued or adhered to adjacent sheets in refill 303 to provide mechanical integrity to such refill during manual and machine handling of refill 303. The strength of adhesion provided between adjacent sheets is preferably selected so as to be strong enough to prevent plates, such as plate 102, from being unintentionally separated from the remainder of refill 303 during manual handling of refill 303, but weak enough to permit separation of one plate from a remainder of refill 303 by an appropriate advancement mechanism without deforming a remainder of refill 303. One commercially available adhesive which has been found effective for this purpose is PRITT® glue, provided in solid, “rub-on” form, and available from HENKEL®. However, other types of solid stick rub-on glue may be employed, and all such variations are intended to be included within the scope of the present invention.

It will be appreciated that the present invention could be practiced employing a range of different adhesive mechanisms including various brands of solid and liquid glue. Moreover, attachment means other than glue, including mechanical clips, mechanical clamps, as well as electrical, magnetic, and/or electromechanical mechanisms could be employed to provide a fully consumable refill of staple wires or other package of consumable parts, so